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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/550,405	04/14/2000	Eiji IO	APM-01301	8514
7590 12/29/2005			EXAMINER	
muirhead and saturnelli, LLC			NADAV, ORI	
200 Friberg Parkway, Suite 1001			ART UNIT	PAPER NUMBER
Westborough, MA 01581			2811	

DATE MAILED: 12/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

**Office Action Summary**

Application No.

09/550,405

Applicant(s)

IO, EIJI

Examiner

Ori Nadav

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**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,5-7,11 and 20-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,5-7,11 and 20-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Specification***

The amendment to page 12, line 9, filed on 05/09/2005, is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention.

Applicant is required to cancel the new matter in the reply to this Office Action.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 5-7, 11 and 20-23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no support in the specification, as filed, for all of said at least one second heavily doped drain and source diffusion layer that is disposed at said surface of said semiconductor substrate has a lateral dimension along the surface of said semiconductor substrate that is

approximately equal to and aligned with the lateral dimension of said sidewall offset, as recited in claims 1 and 6, because said at least one second heavily doped drain and source diffusion layer is formed around said gate electrode, and said at least one second heavily doped drain and source diffusion layer that is located on the left side of the gate electrode does not have a lateral dimension along the surface of said semiconductor substrate that is approximately equal to and aligned with the lateral dimension of said sidewall offset.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng et al.

Cheng et al. teach in figure 15 a semiconductor device comprising:

- (a) a semiconductor substrate 11;
- (b) an insulating film 19 formed at a surface of said semiconductor substrate for defining device regions in each of which a semiconductor device is to be fabricated;

(c) a gate electrode 28 formed on said semiconductor substrate, said gate electrode and said insulating film defining at least one lightly doped first drain and source diffusion layer 77', 78';

(d) at least one sidewall 66 covering said gate electrode therewith; and

(e) at least one heavily doped second drain and source diffusion layer 82, 84 formed at a surface of said semiconductor substrate around said gate electrode,

said at least one sidewall having connected thereto a sidewall offset extending outwardly of said gate electrode along the surface of said semiconductor substrate in at least one of regions below which said at least one heavily doped second drain and source diffusion layer is to be formed, said sidewall offset having a lateral dimension extending along a lateral surface of a gate oxide film on which said gate electrode is formed by an amount that is greater than a thickness of said sidewall,

(f) low resistive wiring layers 64 formed at surfaces of the source and drain layers being located outwardly beyond a peripheral edge of the sidewall offset,

said at least one heavily doped second drain and source diffusion layer extending below said sidewall offset but spaced outwardly away from an edge of the gate electrode in a direction along said surface of said semiconductor substrate,

wherein all of said at least one second heavily doped drain and source diffusion layer that is disposed at said surface of said semiconductor substrate has a lateral dimension along the surface of said semiconductor substrate that is approximately equal to and aligned with (parallel aligned with) the lateral dimension of said sidewall offset in a vertical direction.

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Cheng et al. do not teach in the embodiment of figure 15 at least one lightly doped first drain and source diffusion layers surrounding at least one heavily doped second drain and source diffusion layers on at least a bottom and a lateral side and extending towards the gate electrode beyond an edge of the sidewall offset.

Cheng et al. teach in the embodiment of figure 7 first drain and source diffusion layers 43, 44 surrounding second drain and source diffusion layers 57, 58 on at least a bottom and a lateral side, wherein the first drain and source diffusion layers extend towards the gate electrode beyond an edge of the sidewall offset.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to form first drain and source diffusion layers surrounding the second drain and source diffusion layers on at least a bottom and four lateral sides wherein the first drain and source diffusion layers extend towards the gate electrode beyond an edge of the sidewall offset, in Cheng et al.'s device, in order to improve the device characteristics by forming LDD regions in the device, and in order adjust and optimize the device characteristics by extending the first drain and source diffusion layers towards the gate electrode beyond an edge of the sidewall offset.

Claims 5, 7, 11, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng et al. in view of Kunishima et al.

Regarding claim 7, Cheng et al. teach substantially the entire claimed structure, as applied to claims 1 and 6 above, except a silicide layer comprising titanium silicide. Kunishima et al. teach in figure 5C a silicide layer 21 comprising titanium silicide.

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It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a titanium silicide in Cheng et al.'s device, because titanium silicide is a conventional silicide material, of which official notice may be taken.

Regarding claims 5 and 11, Chen et al. do not teach the semiconductor device comprising a memory device. Kunishima et al. teach using the semiconductor device as a CMOS device, and it is well known in the art that CMOS devices are used as memory devices. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use Cheng et al.'s device as a memory device, in order to use the device in an application which requires memory device.

Note that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

Regarding claims 21 and 23, Kunishima et al. teach in figure 5C a sidewall entirely covering the gate electrode. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to cover entirely the gate electrode of Cheng et al.'s device with the sidewall in order to provide better protection for the gate in an application which does not require external connection to the gate.

Claims 20 and 22, insofar as in compliance with 35 U.S.C. 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng et al. in view of Gonzalez (5,439,835)

Cheng et al. teach substantially the entire claimed structure, as applied to claims 1 and 6 above, except a sidewall offset extending in only one direction towards the source and drain diffusion layers.

Gonzalez teaches in figure 9 a sidewall offset extending in only one direction towards the source and drain diffusion layers.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a sidewall offset extending in only one direction towards the source and drain diffusion layers in Cheng et al.'s device, in order to improve the characteristics of the device.

### ***Response to Arguments***

Applicant argues that the amendment to the specification does not introduce new matter, because figure 3 provides support to said amendment and to the claimed limitations of all of said at least one second heavily doped drain and source diffusion layer that is disposed at said surface of said semiconductor substrate has a lateral dimension along the surface of said semiconductor substrate that is approximately equal to and aligned with the lateral dimension of said sidewall offset, as recited in claims 1 and 6.



Applicant further argues that additional support is provided in page 9, lines 11-16 and on page 12, lines 11-14 in which is disclosed that the sidewall offsets 54 make it possible to keep the source and drain diffusion layers 65 and 66 of NMOS and PMOS transistors 10 and 20 away from edges of the gate electrodes 52.

The disclosure clearly states that the formation of sidewall offsets 54 ensure that the drain and source diffusion layers 65 and 66 extend beyond the peripheral edges of the sidewall offsets 54, and reach the sidewalls 53. "That is, distal ends of the drain and source diffusion layers 65 and 66 are located below either the sidewall 53 or the sidewall offset 54". There is no support for the claimed limitations of all of said at least one second heavily doped drain and source diffusion layer that is disposed at said surface of said semiconductor substrate has a lateral dimension along the surface of said semiconductor substrate that is approximately equal to and aligned with the lateral dimension of said sidewall offset, as recited in claims 1 and 6.

Furthermore, the claimed structure requires a process of making, wherein all said at least one second heavily doped drain and source diffusion layer are aligned with the lateral dimension of said sidewall offset. However, no method is recited in the disclosure regarding the alignment of all said at least one second heavily doped drain and source diffusion layer with the lateral dimension of said sidewall offset.

Regarding applicant argument that page 9, lines 11-16 and on page 12, lines 11-14 provide support for said amendment and claimed limitations, the statement that the sidewall offsets 54 make it possible to keep the source and drain diffusion layers 65 and 66 of NMOS and PMOS transistors 10 and 20 away from edges of the gate electrodes

52, does not mean that the all of said at least one second heavily doped drain and source diffusion layer that is disposed at said surface of said semiconductor substrate has a lateral dimension along the surface of said semiconductor substrate that is approximately equal to and aligned with the lateral dimension of said sidewall offset. Keeping the source and drain diffusion layers 65 and 66 of NMOS and PMOS transistors 10 and 20 away from edges of the gate electrodes 52, mean that the distal ends of the drain and source diffusion layers 65 and 66 can be located below either the sidewall 53 or the sidewall offset 54, and not necessarily equal to and aligned with the lateral dimension of said sidewall offset.

Moreover, figure 3 does not depict lateral dimension of the source and drain diffusion layers 65 and 66 of NMOS and PMOS transistors 10 and 20 being disposed on either (both) side(s) of the gate electrode 52, as recited in the amendment to the specification. And, figure 3 does not depict that all of said at least one second heavily doped drain and source diffusion layer that is disposed at said surface of said semiconductor substrate has a lateral dimension along the surface of said semiconductor substrate that is approximately equal to and aligned with the lateral dimension of said sidewall offset, as recited in claims 1 and 6.

Applicant argues that Cheng et al. do not teach that all of said at least one second drain and source diffusion laver that is disposed at said surface of said semiconductor substrate has a lateral dimension along the surface of said semiconductor substrate that is approximately equal to and aligned with the lateral

dimension of said sidewall offset, as recited in claims 1 and 6, because layers 82 and 84 in figure 15 are not aligned with sidewall 66 in the vertical direction.

The lateral dimension along the surface of said semiconductor substrate of layers 82 and 84 in figure 15 are aligned with sidewall 66 in the vertical direction, because the inner edge of the lateral dimension along the surface of said semiconductor substrate of layers 82 and 84 is aligned with the inner edge of the lateral dimension of the sidewall offset 66 in the vertical direction.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ori Nadav whose telephone number is 571-272-1660. The examiner can normally be reached between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Ori Nadav', written in a cursive style.

O.N.  
12/23/05

ORI NADAV  
PRIMARY EXAMINER  
TECHNOLOGY CENTER 2800